7th National Housing Conference

30 October to 2 November 2012

Brisbane Convention and Exhibition Centre

People — Place — Productivity

National Housing Conference Brisbane 2012

QUEENSLAND GOVERNMENT

AHURI Australian Housing and Urban Research Institute

Bushfire Responsive Design

Real life responses to energy ratings, bushfire standards and biodiverse sites.

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Head of Landscape Architecture QUT
Registered Architect WA

Key Terms

AS 3959:2009 Building in bushfire prone landscapes

Bushfire attack level (BAL 29 and 40)

Biodiversity Conservation

Energy Efficiency – 6 star ratings requirements

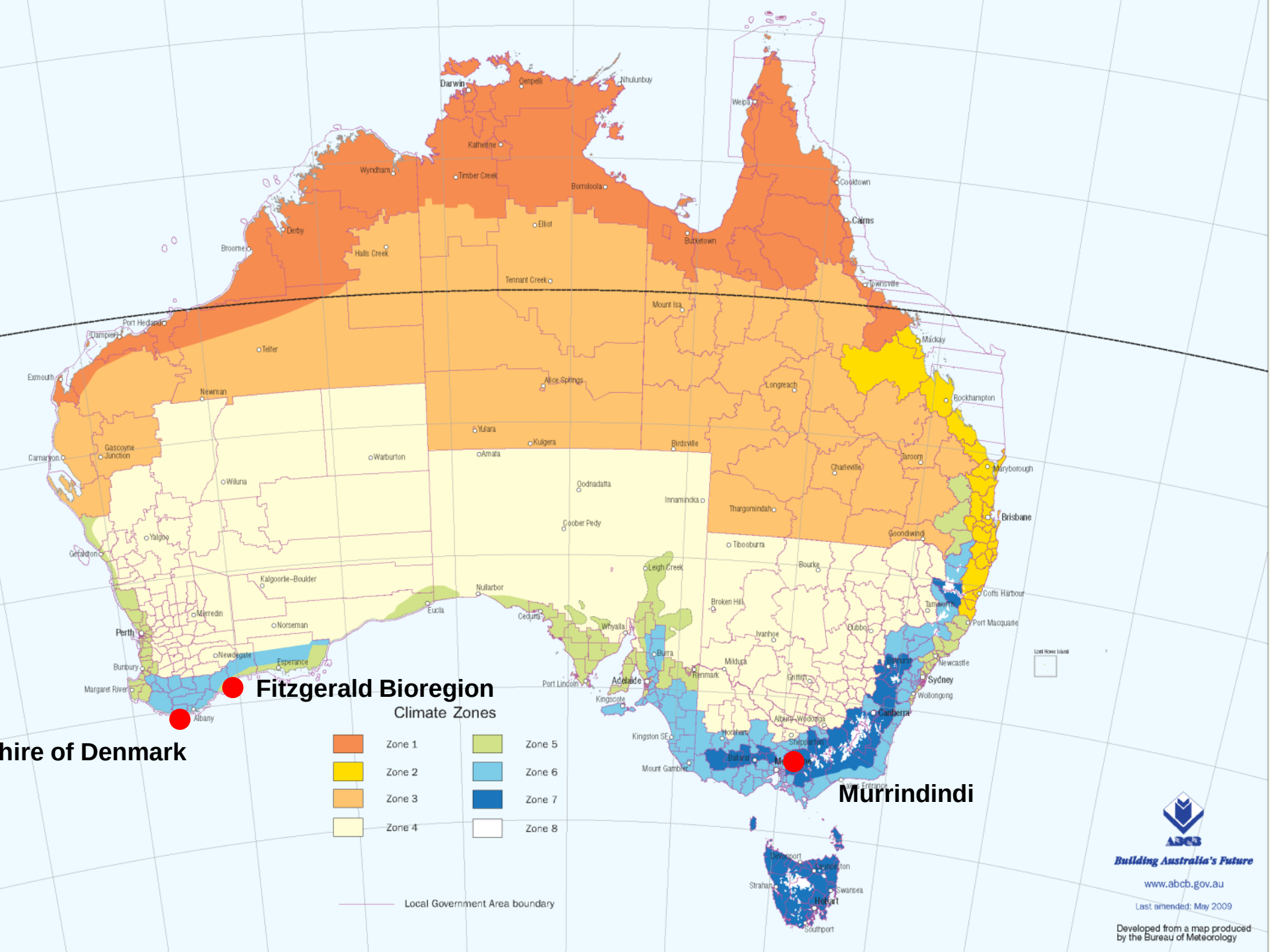
Residential design

2 hour safe zones

Bunkers

Daily Life – behaviour in emergencies

Western Australian and Victorian case study projects

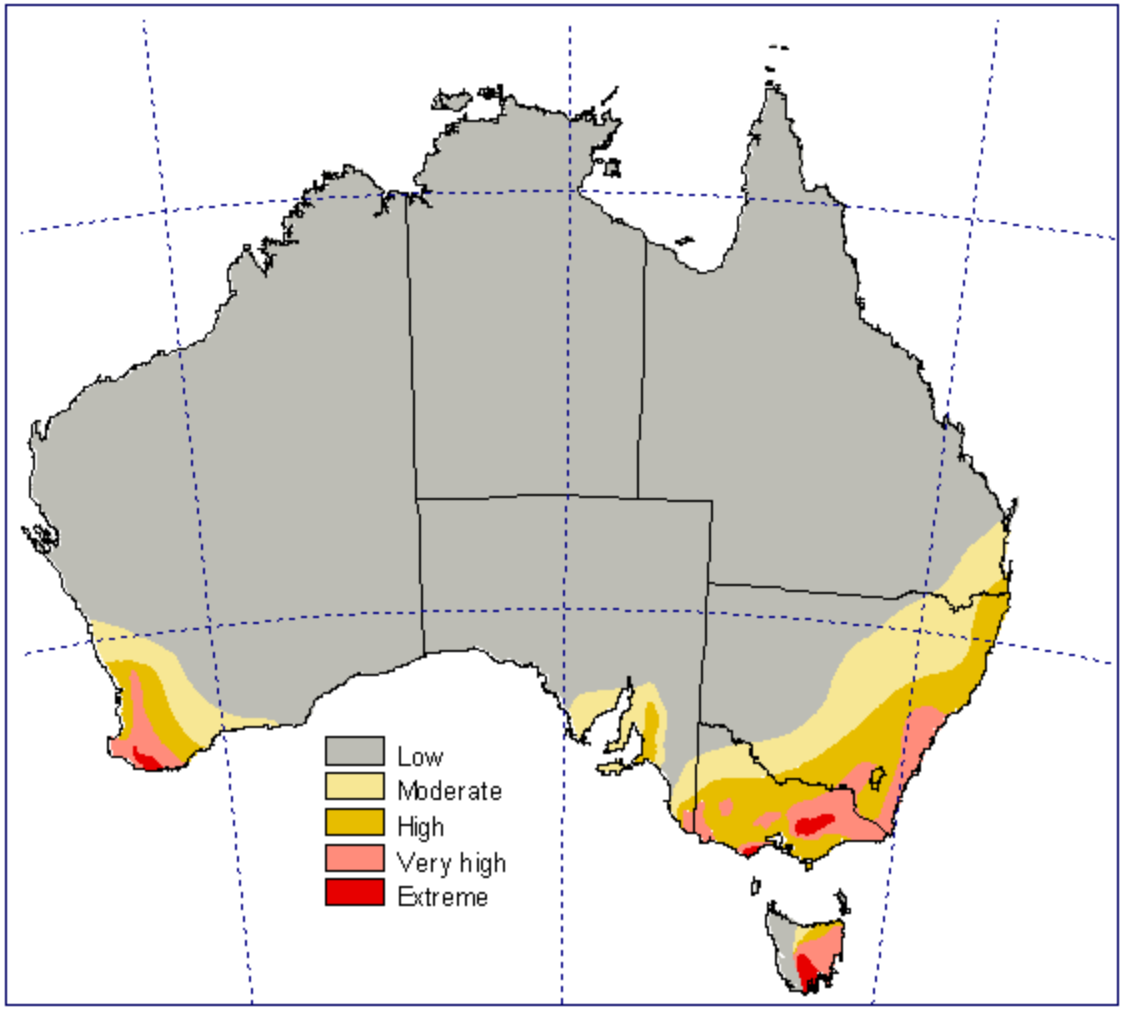


Building Australia's Future

www.abcb.gov.au

Last amended: May 2009

Developed from a map produced by the Bureau of Meteorology



Adapted from Blong R J, Sinai D and Packham C, 2000, Natural Perils in Australia and New Zealand , Swiss Reinsurance, Sydney

Case Study Area 1. Murrindindi , Victoria

A ‘Black Saturday’ affected rural property (100 ha)

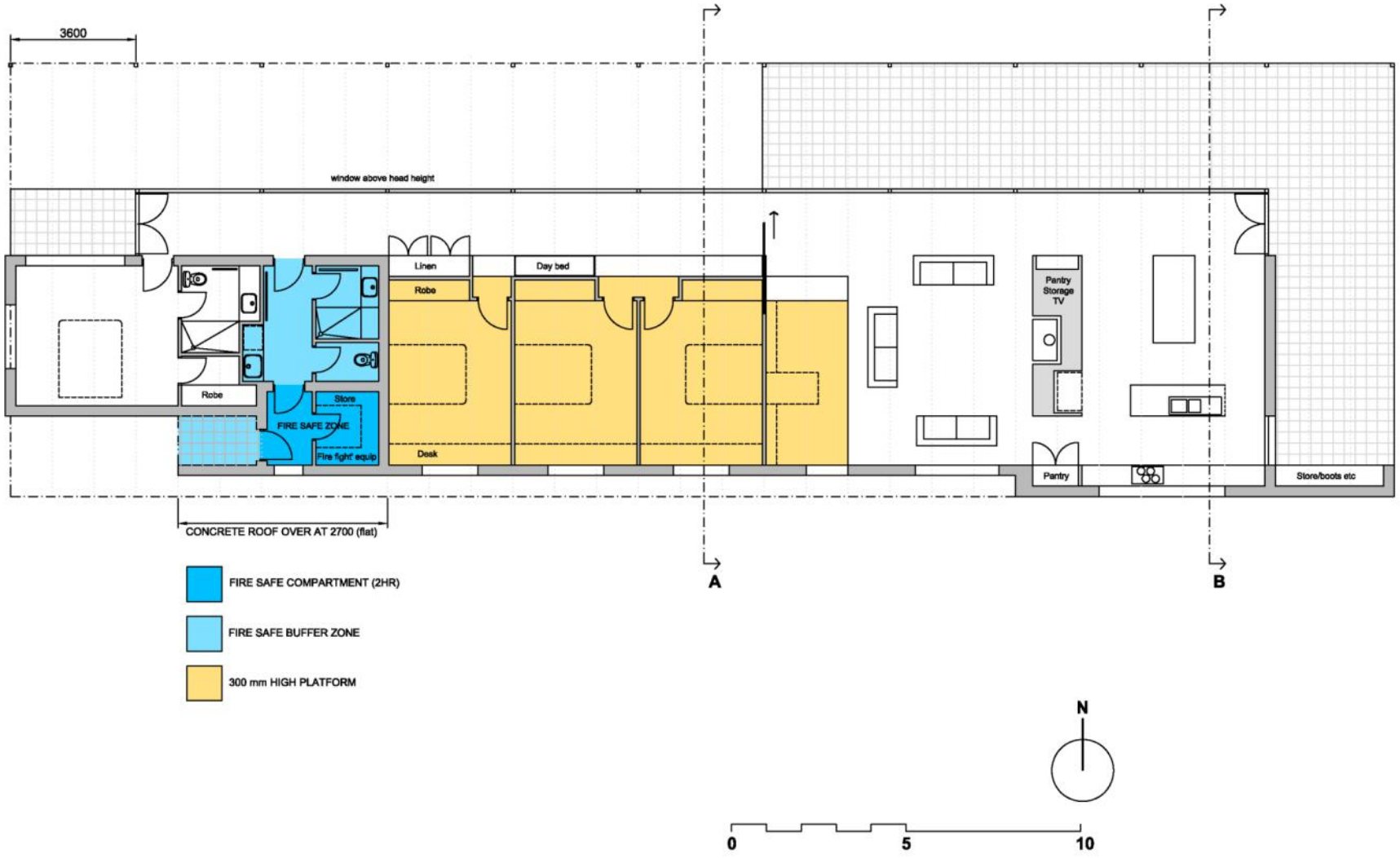
The local government has imposed AS 3959:2009

Climate Zone 6-7

Historic home and shed destroyed when residents where away

Choice of range of sites for new house

Budget $250K


3600
window above head height
Linen
Day bed
Robe
Pantry
Storage
TV
Robe
Store
FIRE SAFE ZONE
Fire fight' equip
Desk
Pantry
Store/boots etc
CONCRETE ROOF OVER AT 2700 (flat)
A
B
FIRE SAFE COMPARTMENT (2HR)
FIRE SAFE BUFFER ZONE
300 mm HIGH PLATFORM
N
0
5
10

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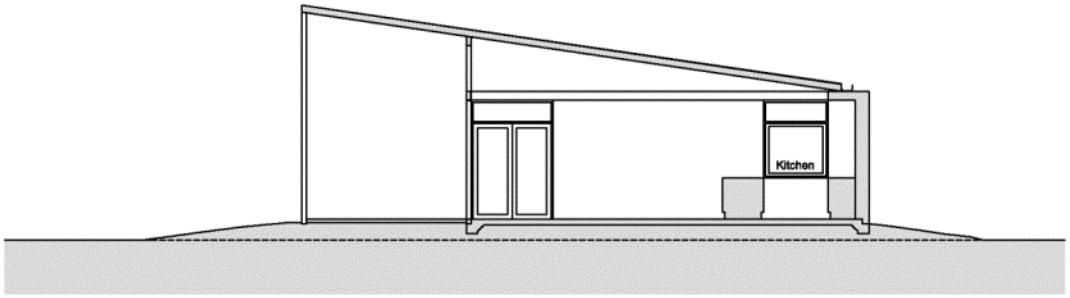
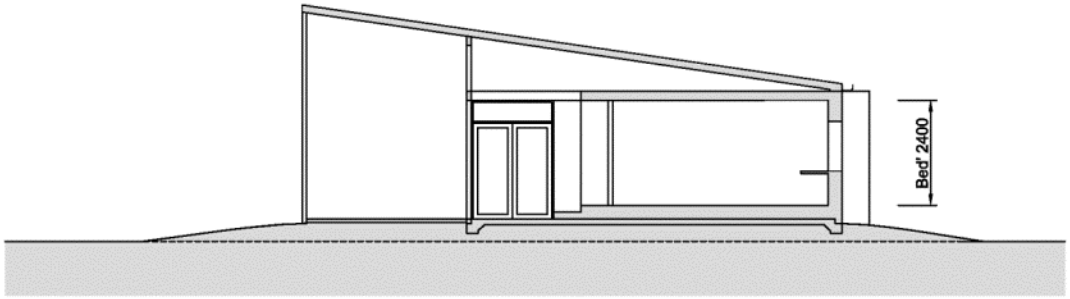
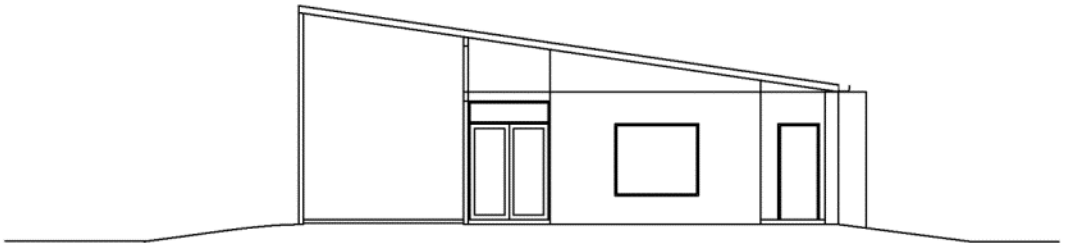


SECTION B



SECTION A



EAST ELEVATION

0 5 10

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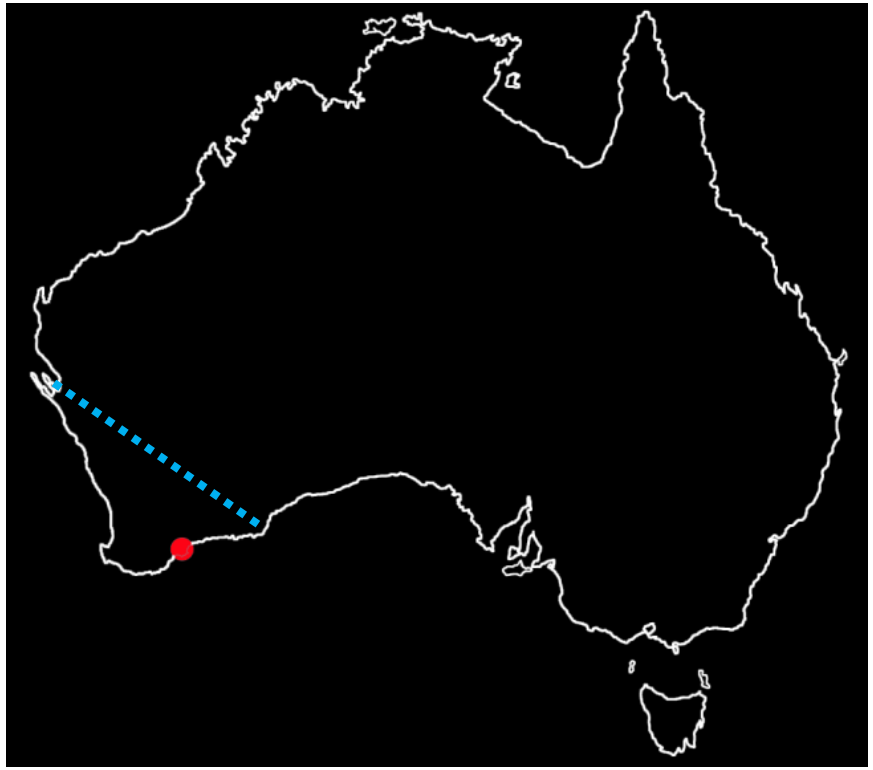
Case Study Area 2: Shire of Jerramungup, Western Australia

The sites are in the world renowned Fitzgerald Biosphere Reserve one of 34 Global biodiversity hotspots – the only such hotspot in Australia

The Shire has imposed AS 3959:2009 on a case by case basis.
Climate Zone 5-6



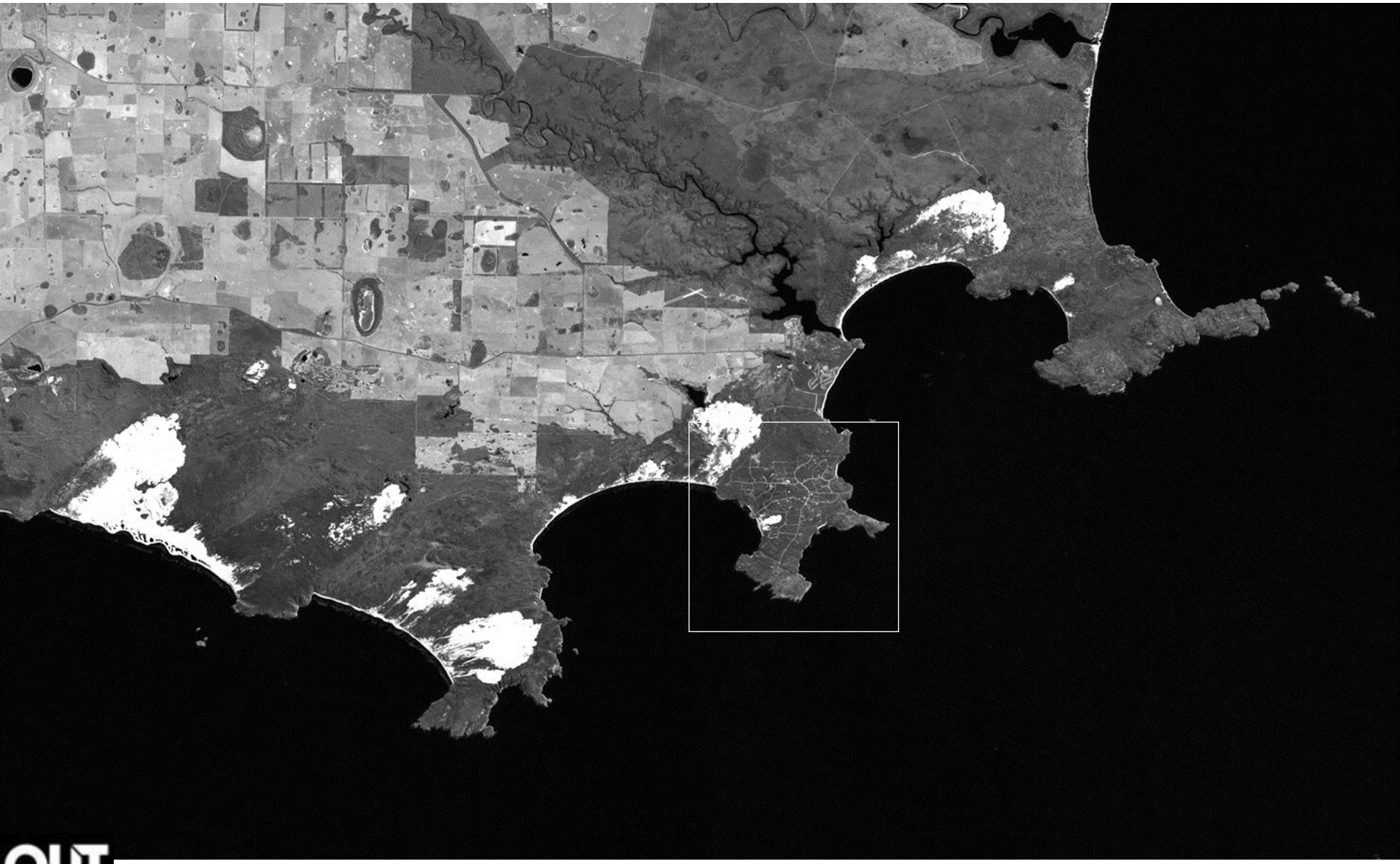
‘Kwongan’ Vegetation

In general, the vegetation is restricted to less than 1.5 metres in height, primarily because moisture supply is insufficient to support woodland or forest.

Due to its physical density and low-lying structure, Kwongan has the visual appearance of a homogenous swathe (figure 1). Such visual homogeneity belies an extreme botanical heterogeneity (figure 2).

Figure 1 Aerial View of Kwongan Landscape

Figure 2 Lot 103, Point Henry Road



Point Henry Peninsula, Bremer Bay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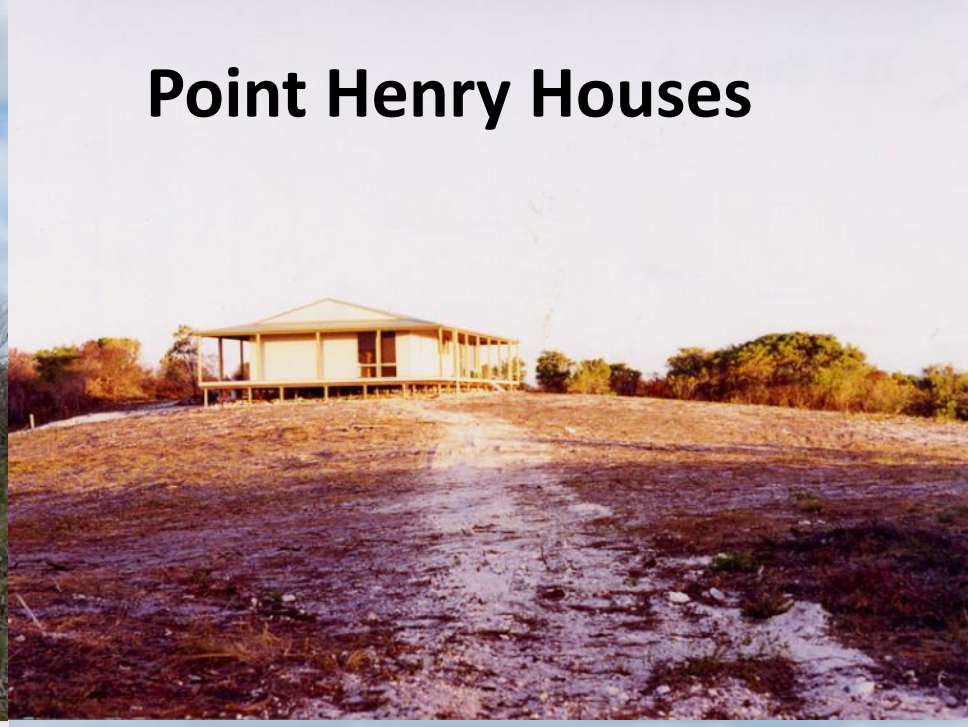
r Bay sites: 2003 bushfire in progress

Point Henry Houses



CONTENT

Fitzgerald River National Park, near Bremer Bay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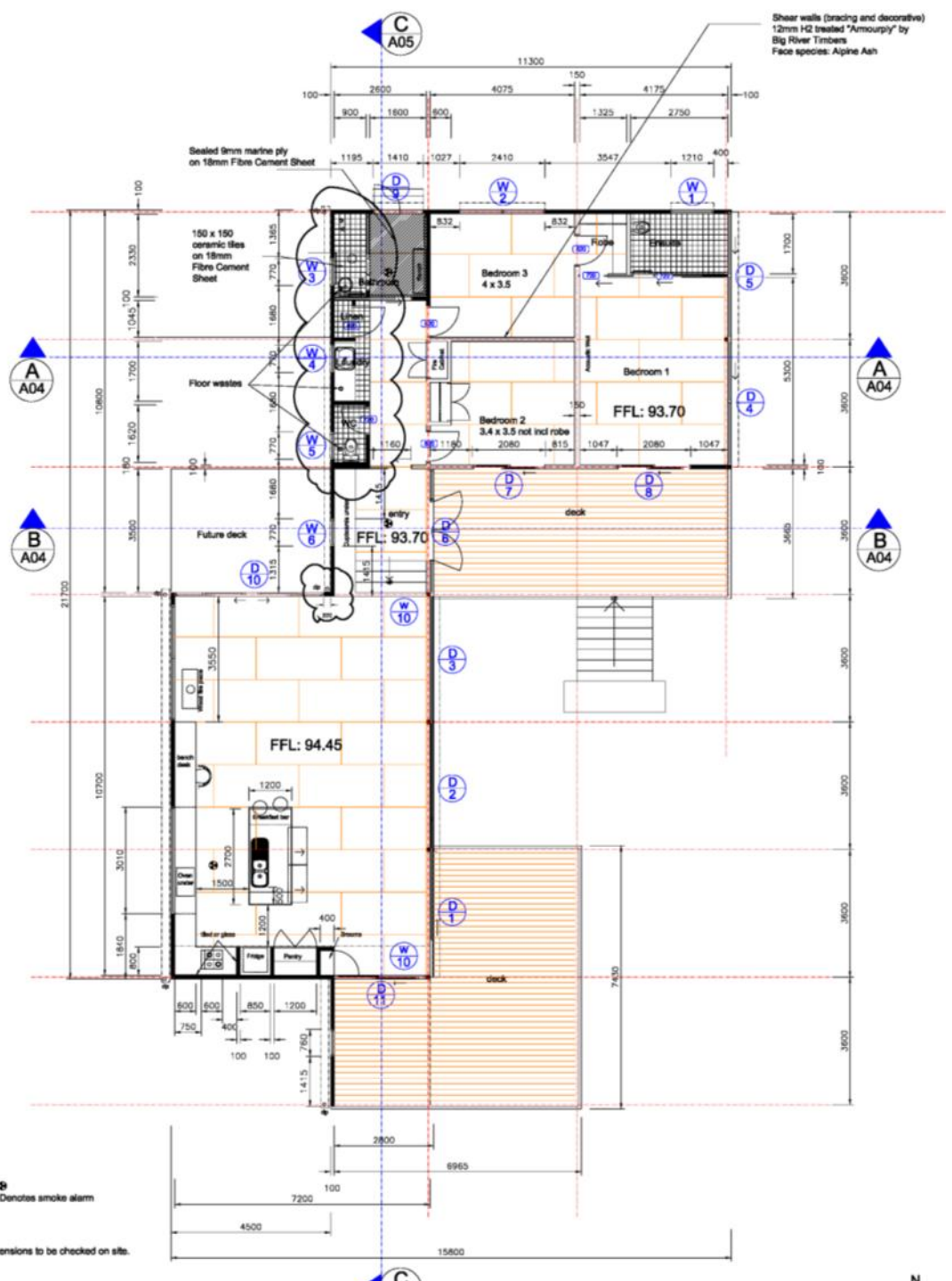
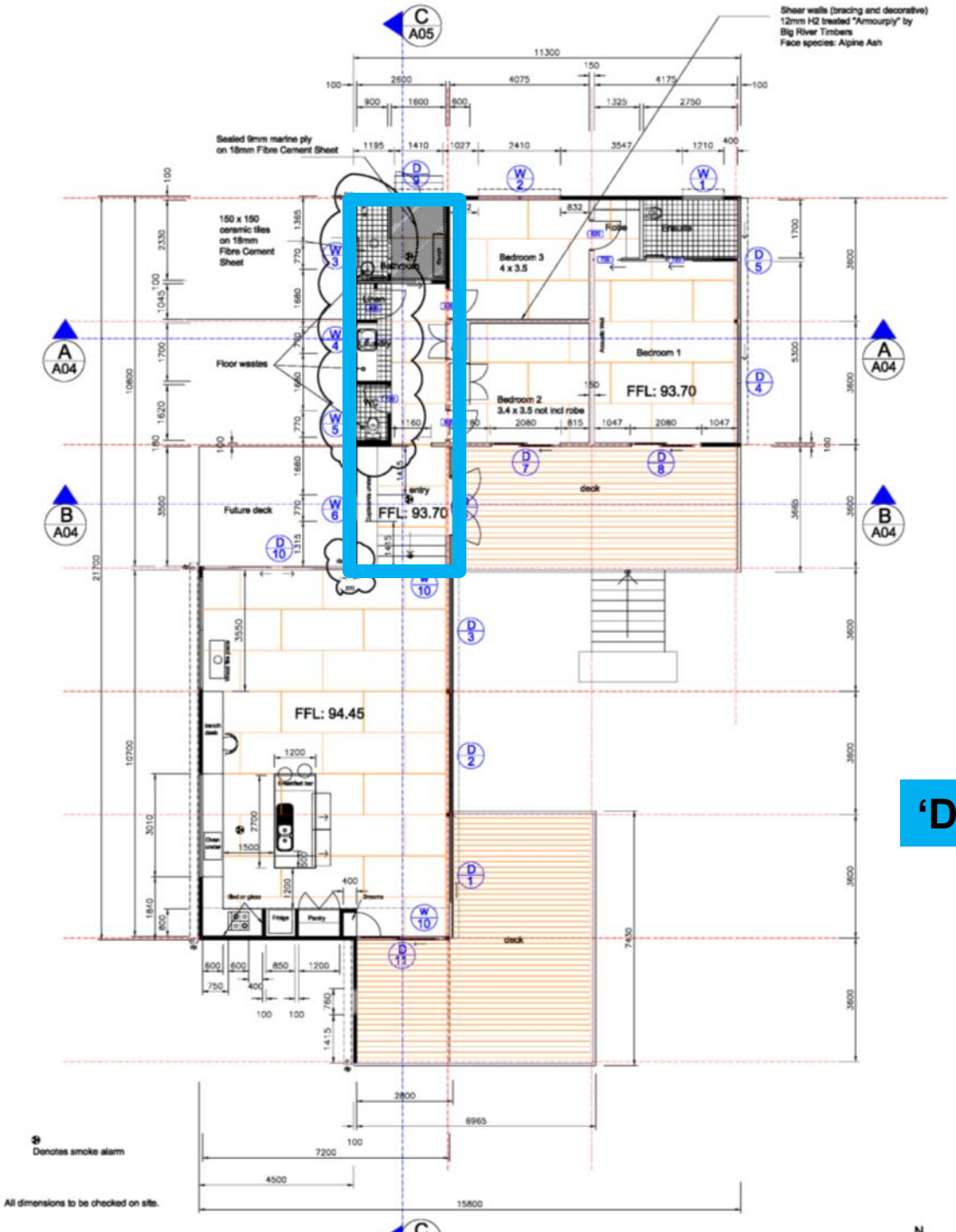
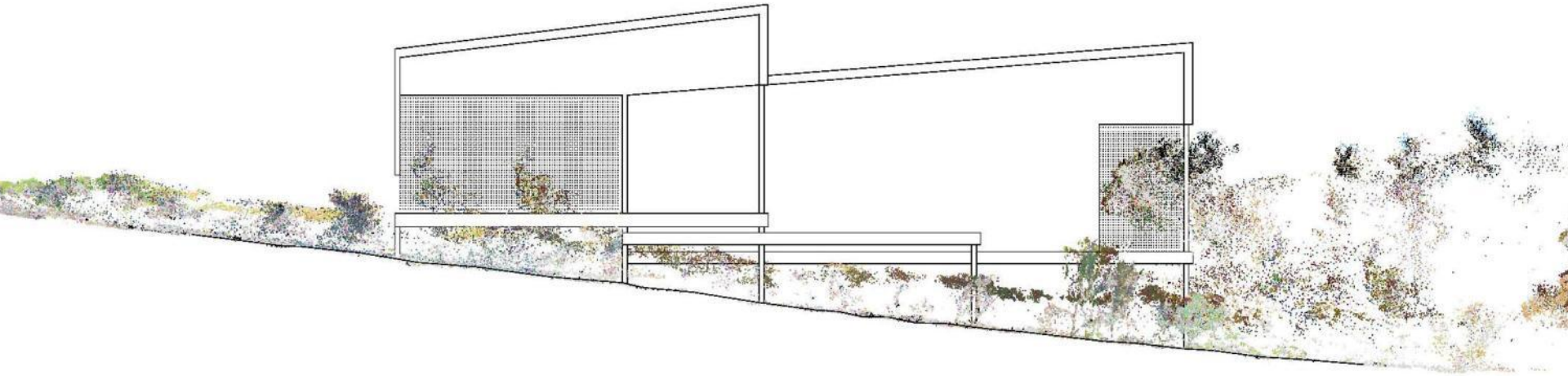
HHouse – bushfire responsive architecture (HABITS + BUSHFIRE)

Site installations

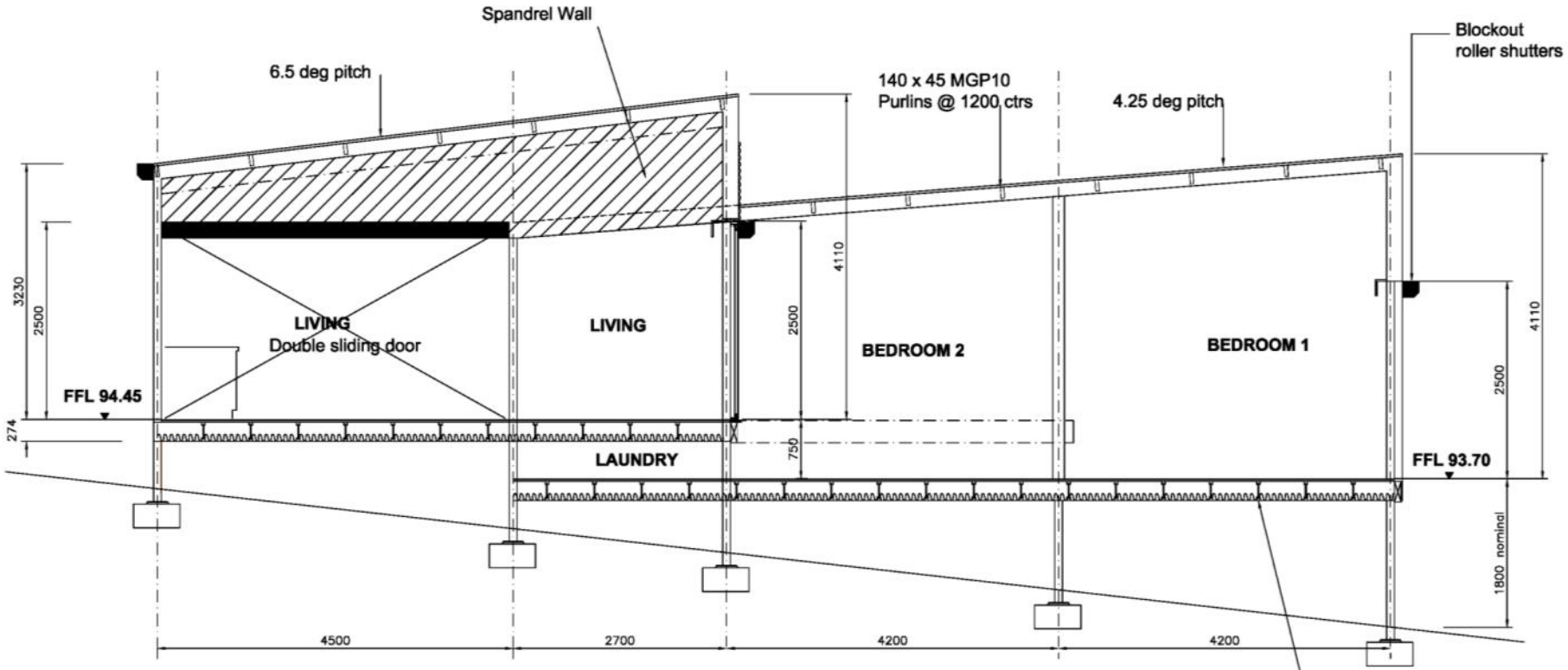

Shear walls (bracing and decorative)
12mm H2 treated "Armourply" by
Big River Timbers
Face species: Alpine Ash
Sealed 9mm marine ply
on 18mm Fibre Cement Sheet
150 x 150
ceramic tiles
on 18mm
Fibre Cement
Sheet
Floor wastes
Future deck
Bedroom 3
4 x 3.5
Bedroom 1
Bedroom 2
3.4 x 3.5 not incl robe
FFL: 93.70
FFL: 93.70
FFL: 94.45
deck
deck
entry
Denotes smoke alarm
All dimensions to be checked on site.
C
A05
A
A04
B
A04
11300
15800



‘Defensible zones’



HHouse indicative drawing



Insulation:
Ceilings: R 2.5 Glass Fibre Batts with reflective foil
Walls: R 2.5 Glass Fibre Batts
Floors: R 2.0 "

COMBINED SECTIONS A-A and B-B

240 x 45 Joists @ 600 ctrs
HiJoist or E-Joist

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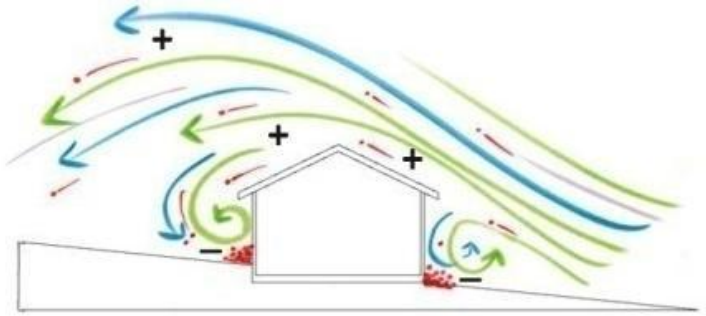
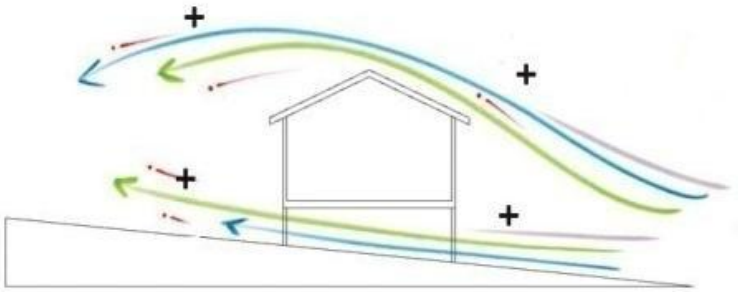
PRINCIPLES | SYNERGIES BETWEEN FLOOD, FIRE AND CYCLONE

1. ELEVATED BUILDINGS

ISSUE In bushfire negative pressure builds up at base of building when it is sited on the ground thereby depositing embers.



PRINCIPLE Research has shown that by elevating building above ground the effect is dramatically reduced.

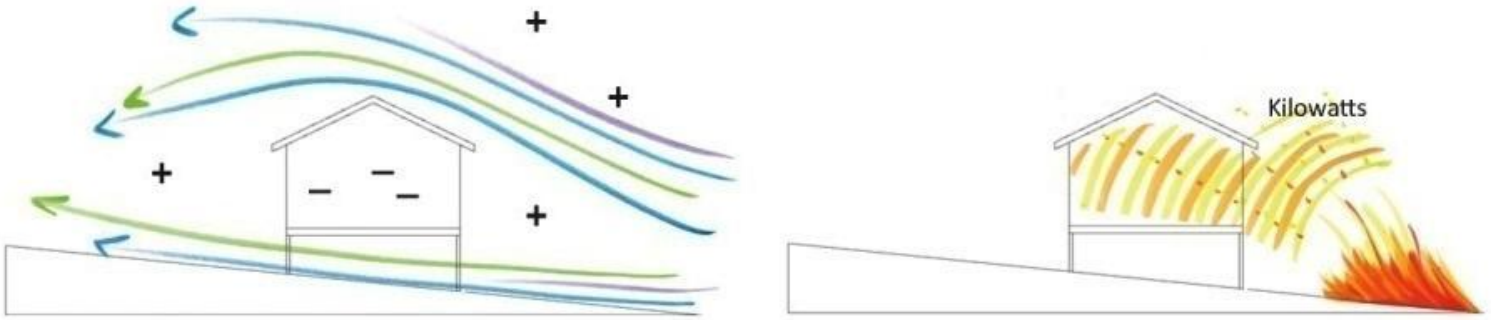


SYNTHESIS The principle works well for flood

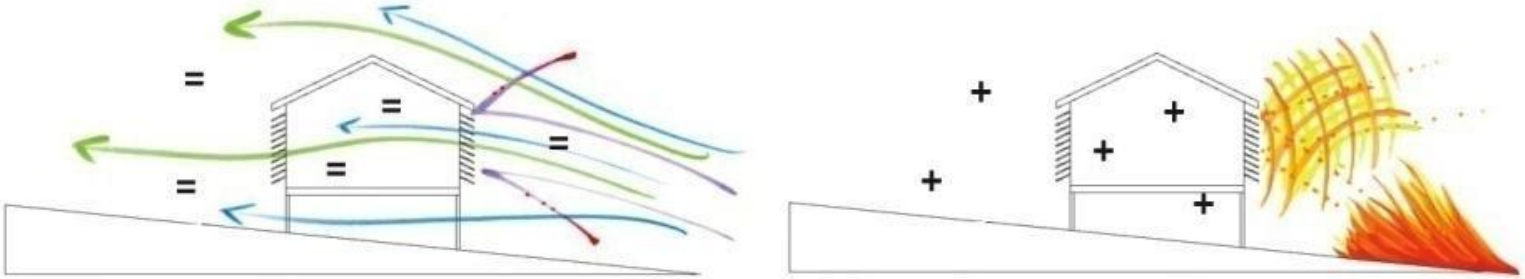
PRINCIPLES | SYNERGIES BETWEEN FLOOD, FIRE AND CYCLONE

2. VENTILATED/ SCREENED ENVELOPE

ISSUE In extreme wind events associated with cyclones and bushfire, negative pressure builds inside sealed buildings causing implosion of windows and roof failures.



PRINCIPLE Make walls permeable with screens that allow pressure equlibrium but protect against projectiles



SYNTHESIS Works for bushfire as well providing radiant heat sheilding with wind protection.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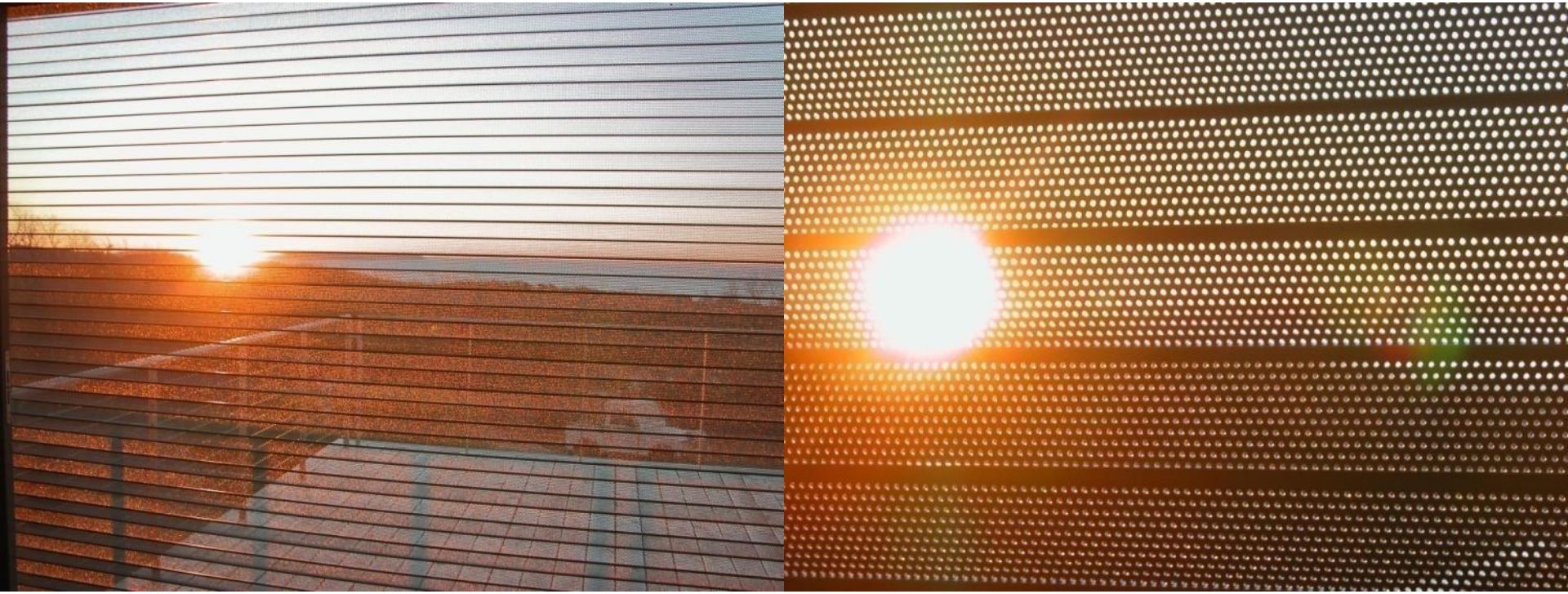


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Cultural shift:
A new typology of architecture for bushfire prone landscapes.

Fighting fire with design

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Not form but per*form*ance

Bushfire becomes less ‘topical’ and more embedded in daily life.

Case Study Area 3: Shire of Denmark, Western Australia

This Shire has imposed Biodiversity Conservation Controls *and* Bushfire Design Standards on the same development sites.

Meaning, that unlike some localities rebuilding after Black Saturday in Victoria, here the home owner can't clear the vegetation to lower the Bushfire Attack Level (BAL).

Two projects – Open Veranda Project, Enclosed Veranda project


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AS 3959:2009 : BAL40

8.5 EXTERNAL GLAZED ELEMENTS AND ASSEMBLIES AND EXTERNAL DOORS

8.5.1A Screens for windows and doors
Where fitted, screens for windows and doors shall have a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel or bronze.

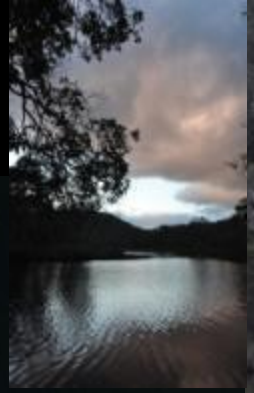
8.5.2 Windows
Window assemblies shall comply with one of the following:
(a) They shall be completely protected by a bushfire shutter that complies with Clause 8.5.1. (only 20% perforated area)

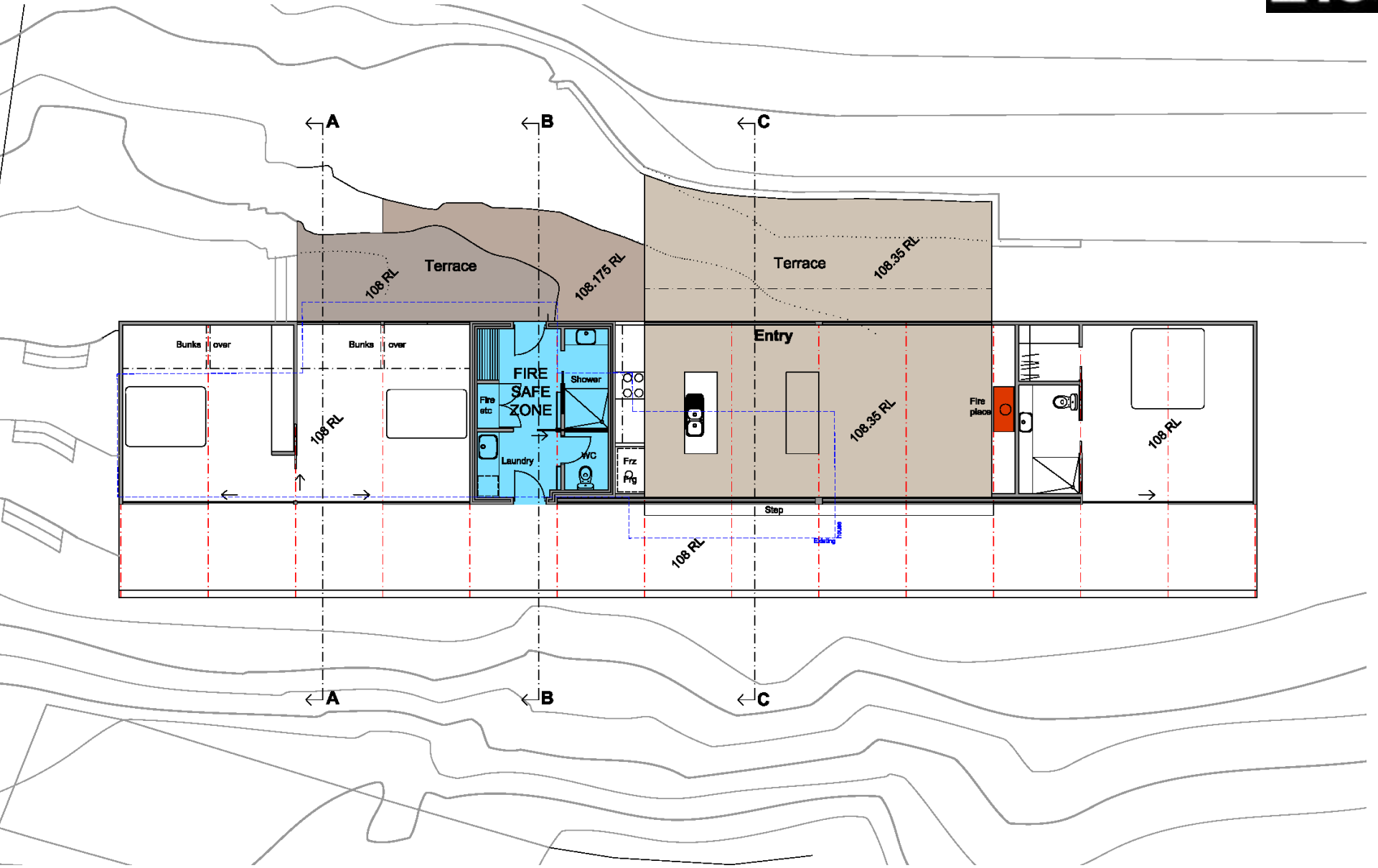
Or;

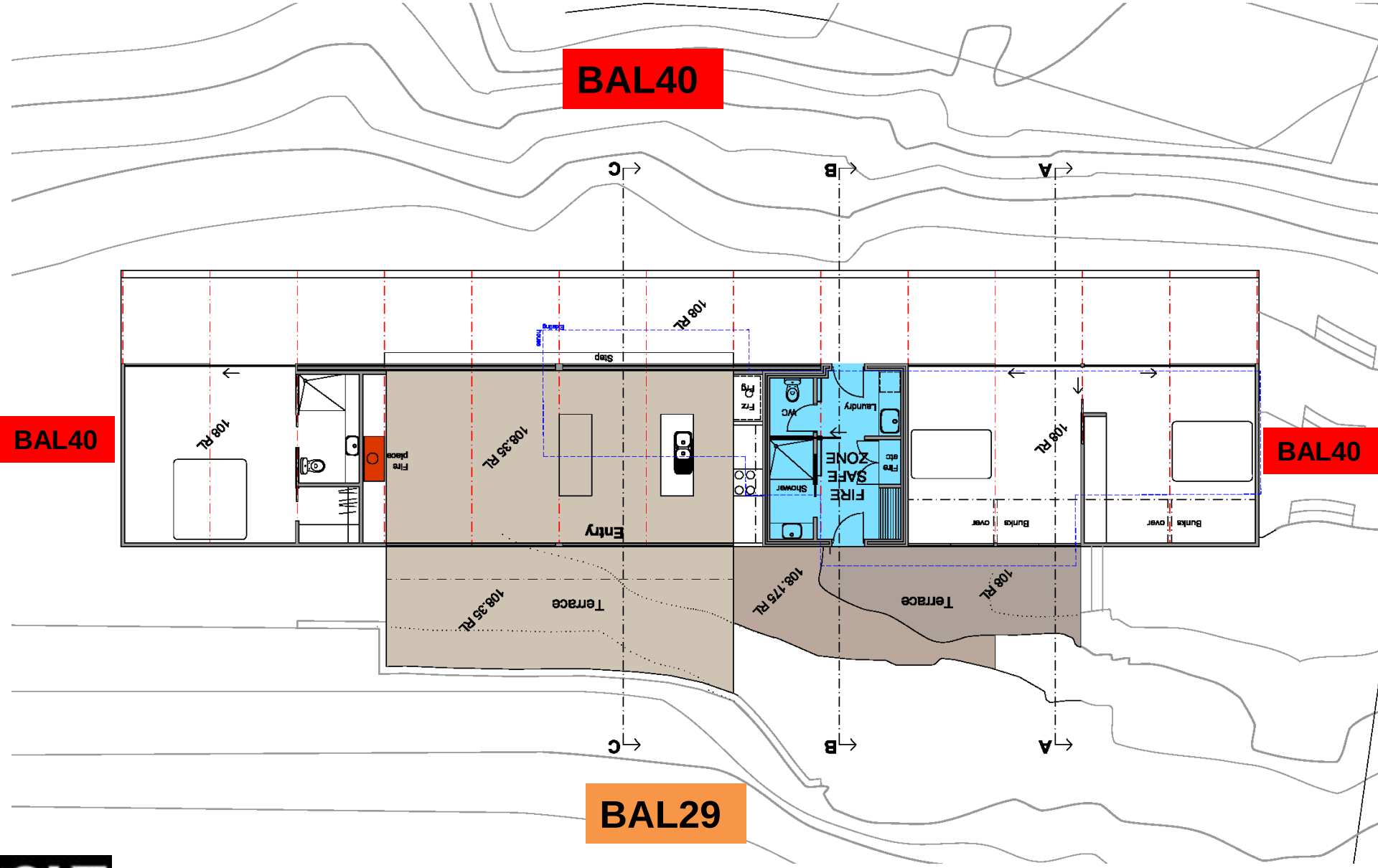
(iii) Both the openable and fixed portions of the window shall be screened externally with screens that comply with Clause 8.5.1A

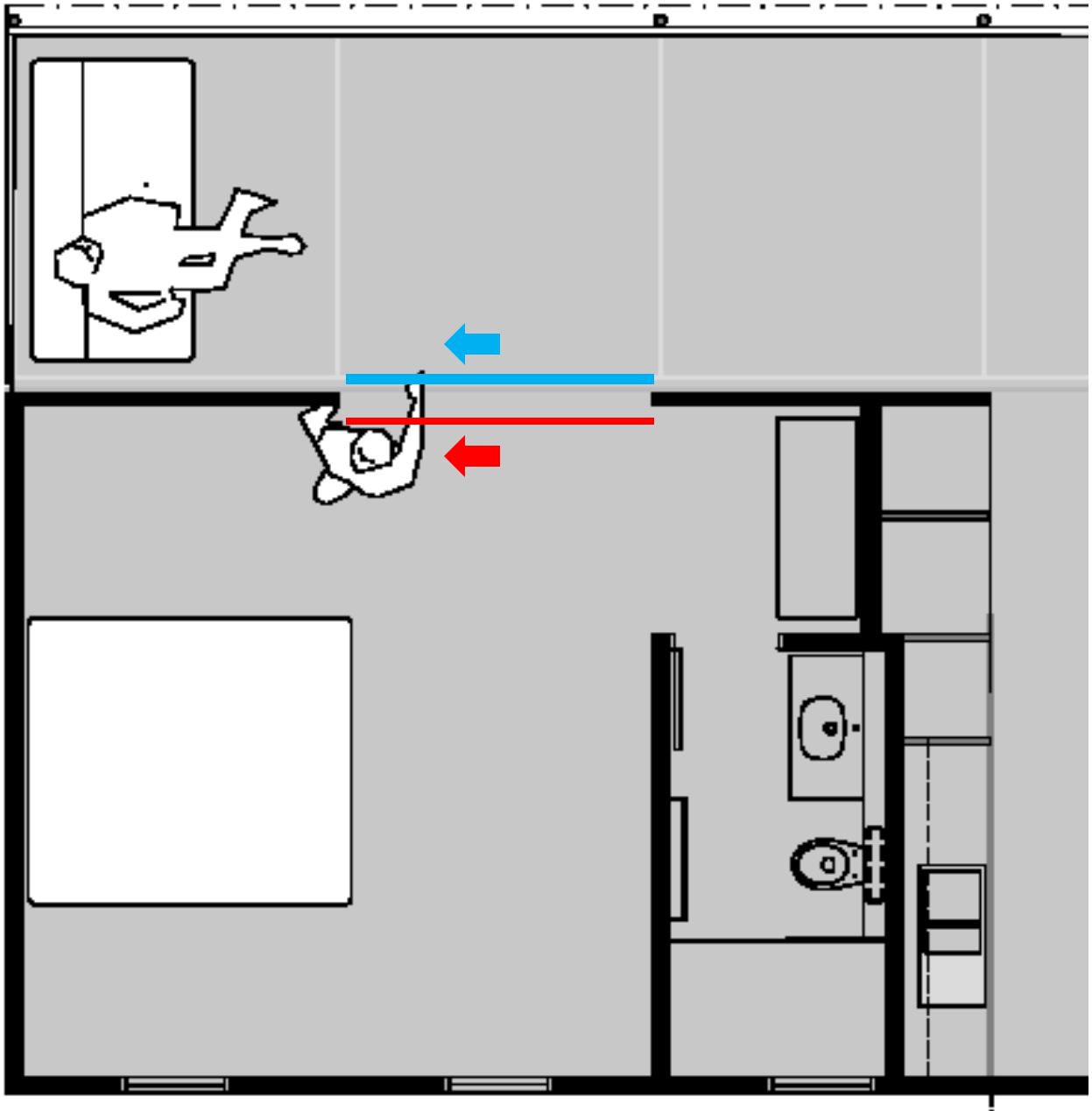
....8.5.4 Doors—Sliding doors

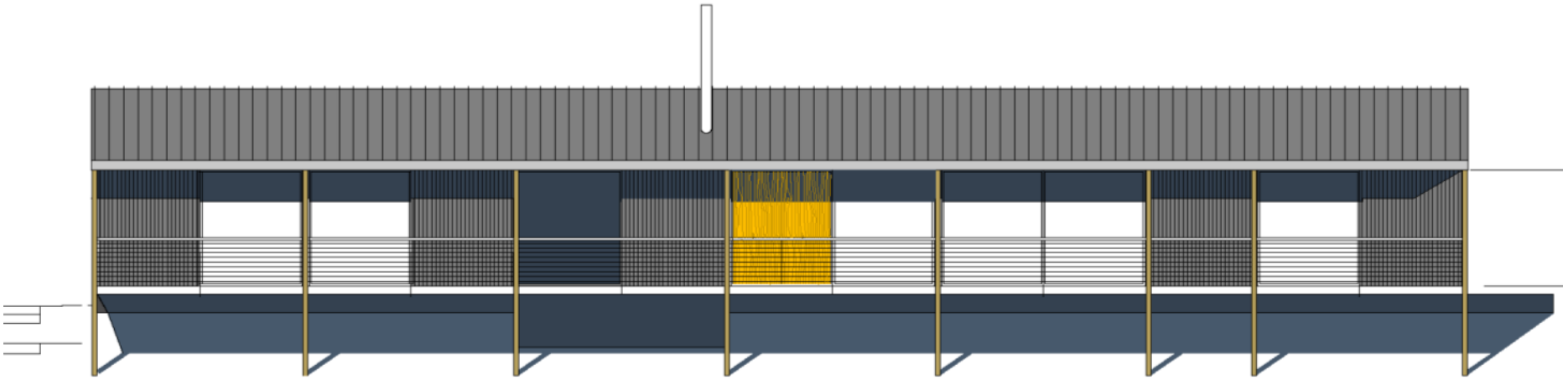
....(iii) Where sliding doors incorporate glazing, the glazing shall be toughened glass minimum 6 mm in thickness and both the fixed and openable portions of doors shall be screened externally with screens that comply with Clause 8.5.1A.



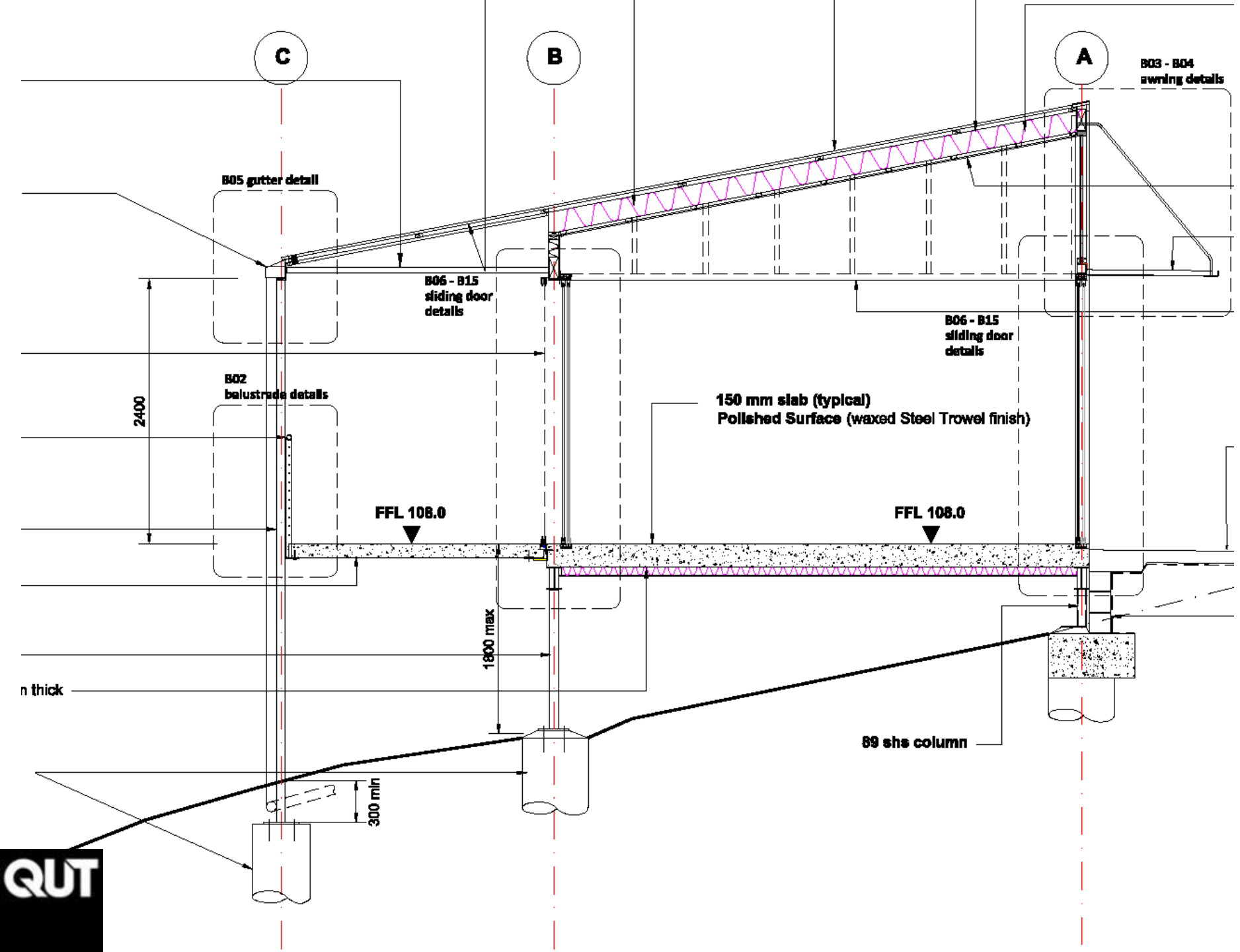

A
B
C
Terrace
108 RL
108.175 RL
Terrace
108.35 RL
Bunks
over
Bunks
over
108 RL
FIRE
SAFE
ZONE
Fire
etc
Shower
Laundry
WC
Frz
Frg
Entry
108.35 RL
Fire
place
108 RL
Step
108 RL
Existing
house
A
B
C


BAL40
BAL40
BAL40
BAL29
C
B
A
C
B
A
108 RL
108.35 RL
108 RL
108.175 RL
108 RL
108.35 RL
Step
Entry
Terrace
Terrace
Fire place
Fr
Fr
WC
Laundry
Shower
FIRE SAFE ZONE
Fire ext
Bunks over
Bunks over



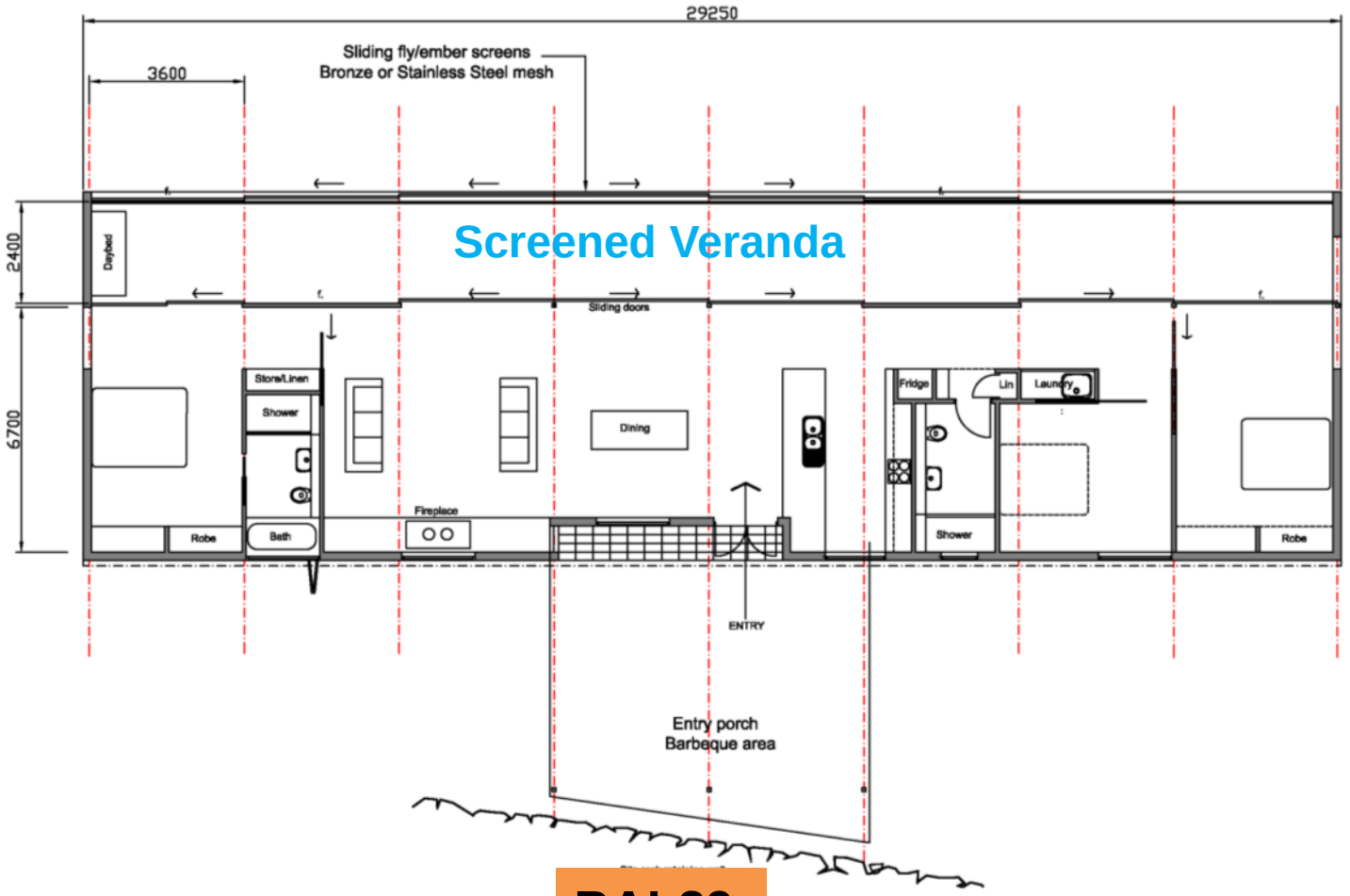


North Elevation


C
B
A
B03 - B04
awning details
B05 gutter detail
B06 - B15
sliding door
details
B06 - B15
sliding door
details
B02
balustrade details
2400
150 mm slab (typical)
Polished Surface (waxed Steel Trowel finish)
FFL 108.0
FFL 108.0
1800 max
n thick
89 shs column
300 min

QUT

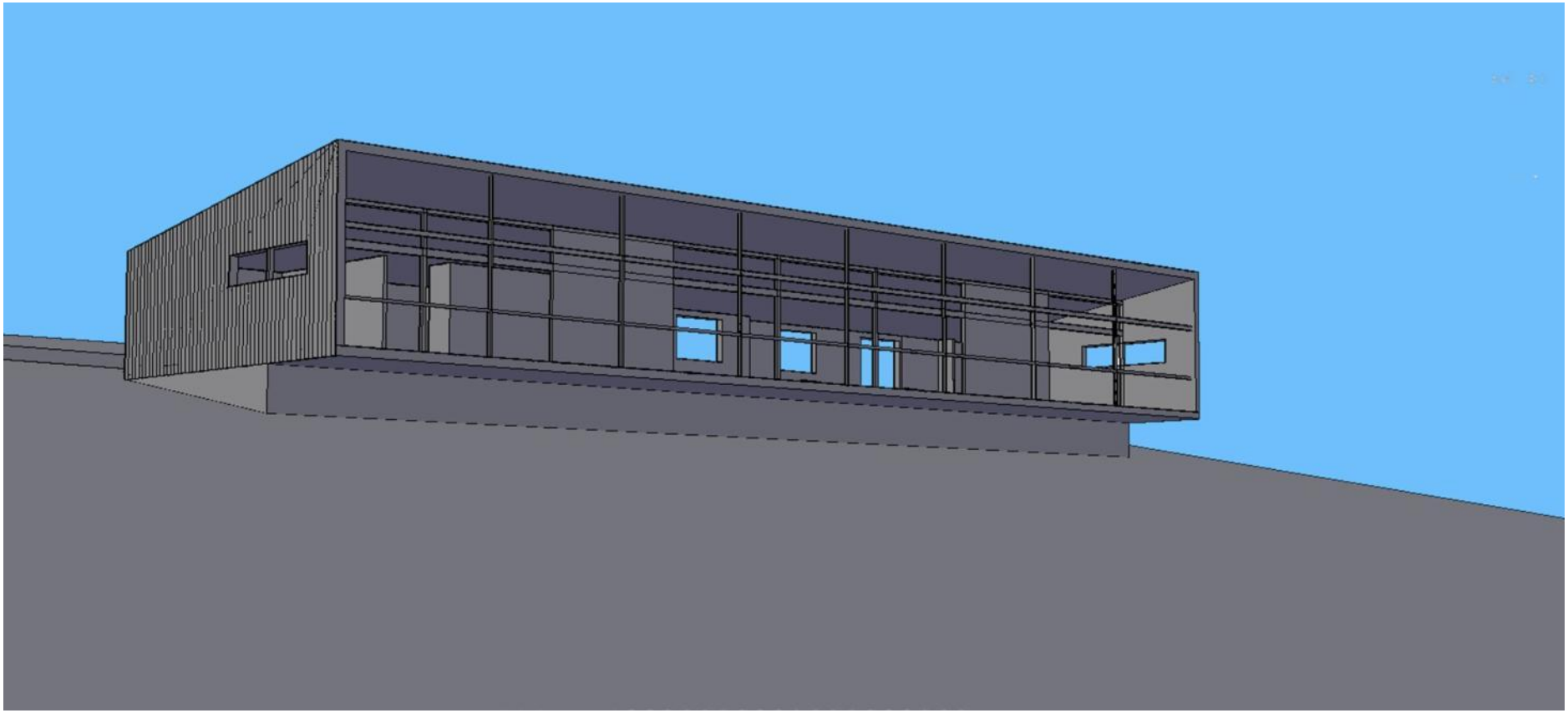
BAL40

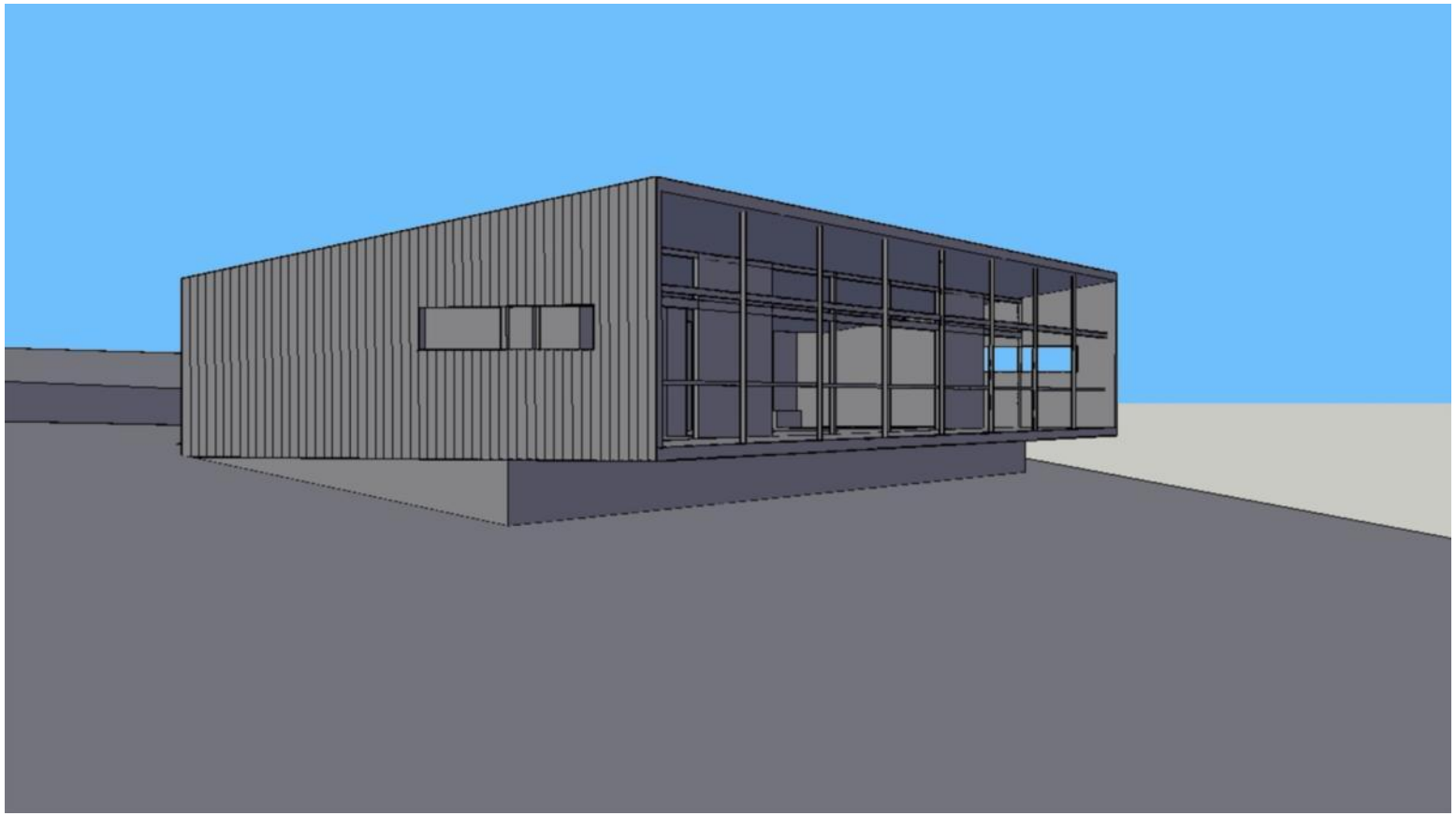


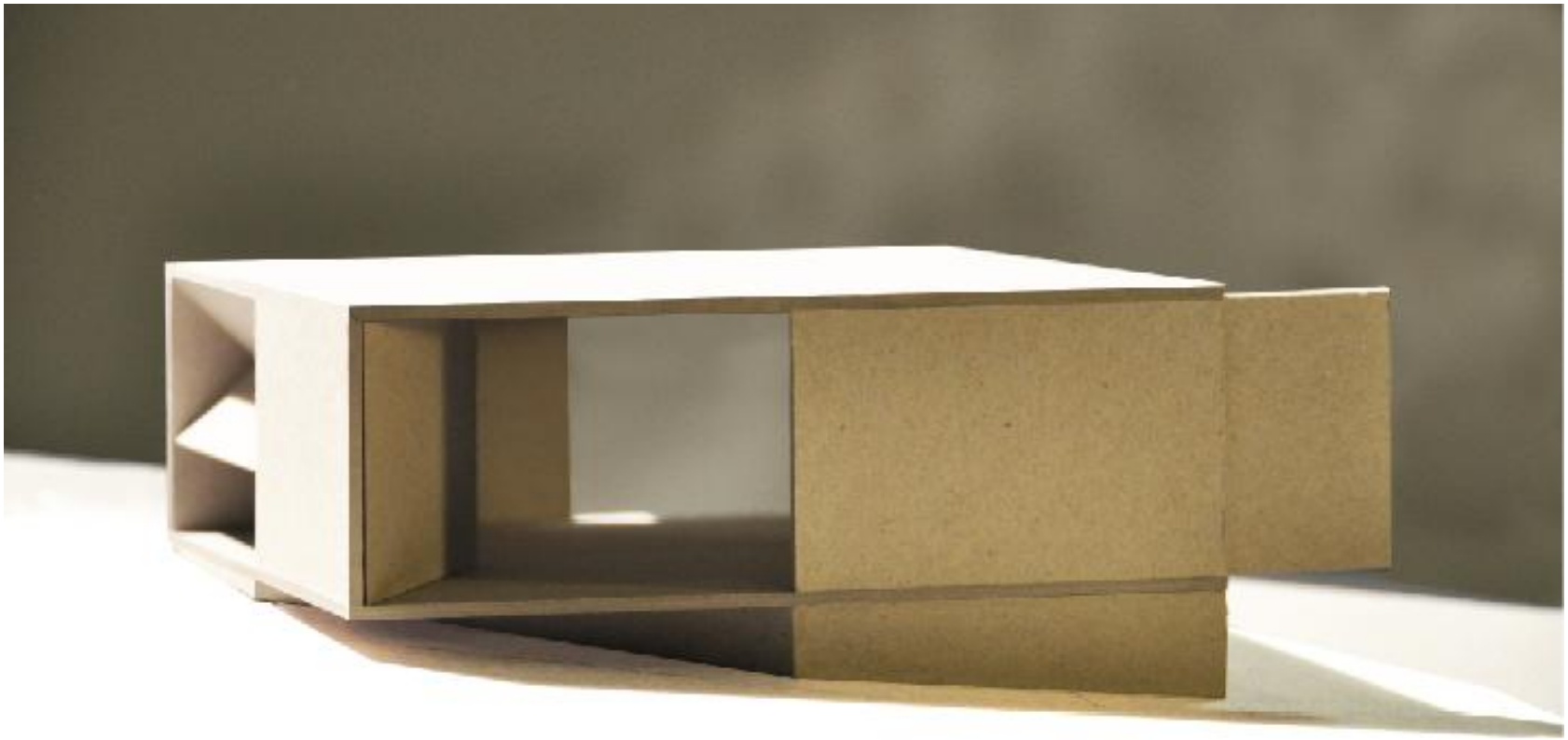
BAL40

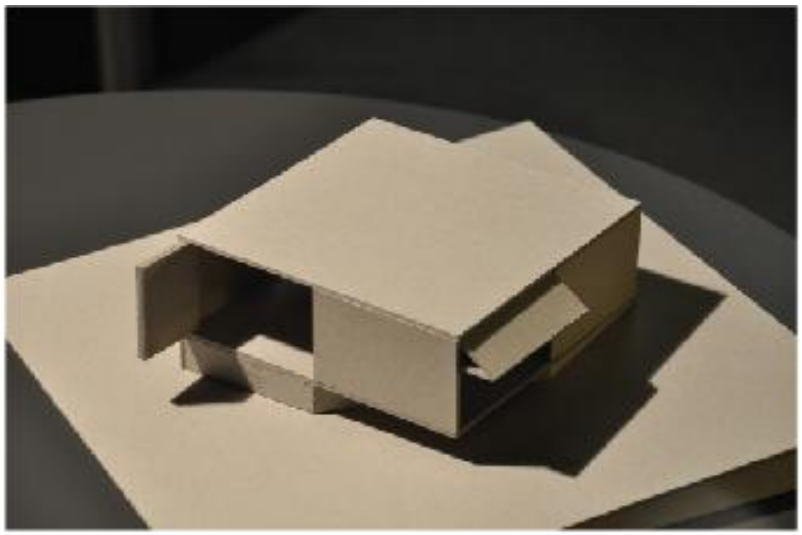
BAL40

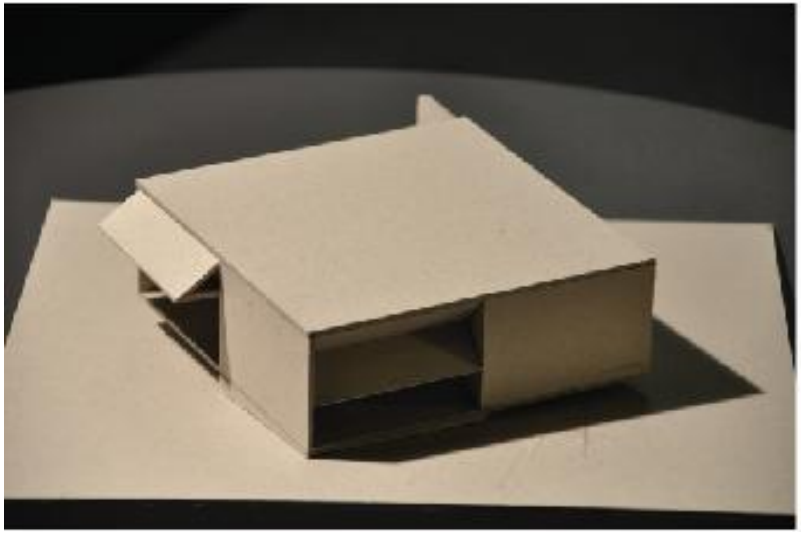
BAL29

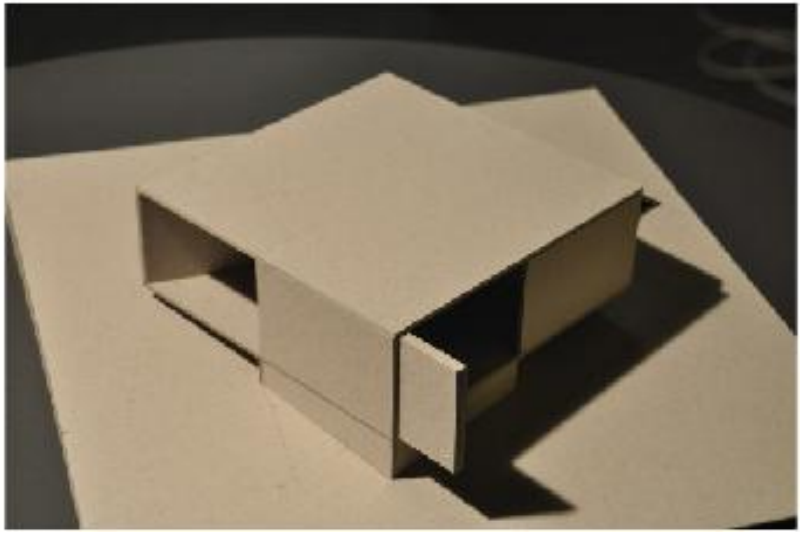












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